The High Plains Drifter

NATIONAL WEATHER SERVICE NORTH PLATTE, NE

http://www.weather.gov/northplatte

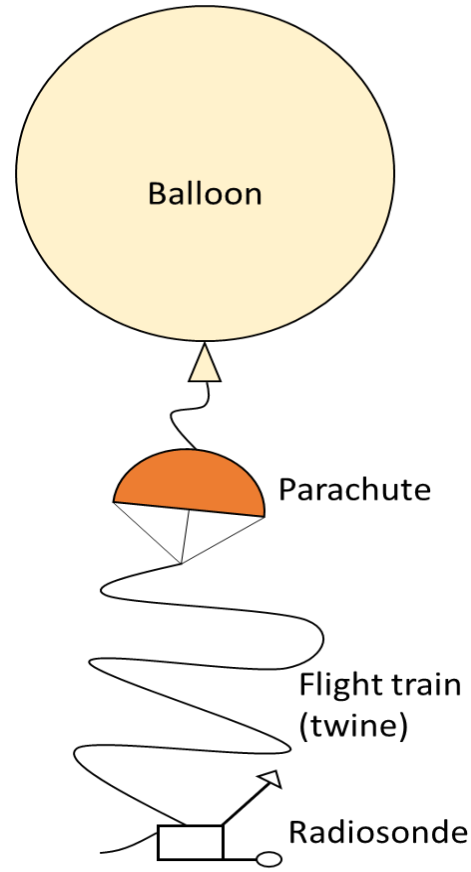
WHAT'S INSIDE

NWS North Platte Using New Radiosondes

By Darren Snively-Senior Meteorologist
Sam Meltzer-Meteorologist

Twice a day every day, meteorologists around the world coordinate to release weather balloons to supplement computer-based weather prediction models, local forecasting, and weather and climate research. They are launched around 12:00 UTC (universal time) and 00:00 UTC, or 6:00 AM CST and 6:00 PM CST local standard time in North Platte.

Additional observations may be taken leading up to and during severe weather events. North Platte is one of 800 upper air observation sites in the world, 92 of which are operated by the National Weather Service in North America and the Pacific. A typical upper air flight lasts around two hours, where the balloons can reach heights of 100,000 feet and ultimately grow to 20 feet in diameter.



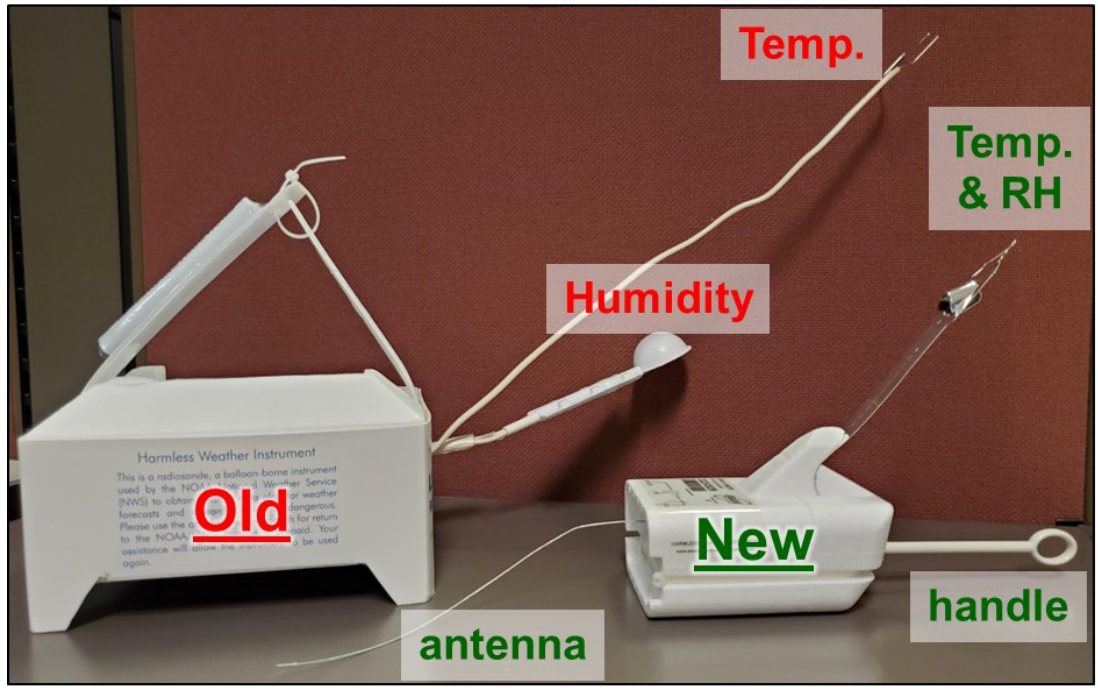
The upper air system is composed of a computer and software, tracking antennas, GPS satellites, a weather balloon, a parachute, and a radiosonde. The radiosonde is a small box that contains weather observation instruments, including a thermometer and humidity sensor, and tracking equipment. In December, our office installed a new radiosonde system for our upper air observations. The Lockheed Martin LMS-6 radiosondes, in use since 2014, were retired and replaced with new Graw DFM-17 radiosondes.

(continued on page 2)

The new radiosondes do not have internal pressure sensors. Instead, they use GPS to determine atmospheric pressure and height. This allows them to be smaller and lighter than the old ones. Because the radiosondes are lighter, we can fill the balloons with less hydrogen and they can still reach the upper atmosphere. Using lighter radiosondes means that sometimes the new radiosondes travel farther than the old ones. With a strong westerly wind, some sondes may go as far as Iowa.

Another difference is how the new radiosondes send data back to the receiver at our office. The previous system included a moving dish on the ground that both tracked the radiosonde's position immediately after launch and received the incoming data. Later in the flight, position was tracked using GPS. The new system has no moving parts. Instead, the data is sent to a stationary omnidirectional antenna on a tower outside the building. The radiosonde's position is tracked using GPS satellites. This change means that the signal is sent on a different radio frequency as well.

The retired Lockheed radiosondes contained a prepaid postage bag along with instructions how to mail the sonde back to NOAA. Recovered radiosondes would then be refurbished at a facility near Kansas City, MO, and eventually be sent to field offices to be launched and flown again. Unlike the LMS-6, the new Graw sondes do not have a return bag as they are single use only.



Snow Squalls
By Jaclyn Gomez—Meteorologist

So you may have heard the term snow squalls recently and may have been wondering, what exactly is a snow squall? Well, a snow squall is a quick burst of snow that is accompanied by strong gusty winds. Snow squalls are short lived, usually only lasting less than 3 hours and usually occur during the daytime.

What makes a snow squall so dangerous? The reason snow squalls are so dangerous is the impacts that can result from these sneaky winter hazards. They can rapidly reduce visibility and create treacherous travel conditions. The sudden reduced visibility from the quick snow burst can lead to chain-reaction accidents on highways and interstates.

The National Weather Service will issue a Snow Squall Warning when snow squall conditions are expected. These warnings are usually 30 to 60 minutes in length and are generally small in coverage, similar to a tornado or severe thunderstorm warning.

If a snow squall warning is issued for an area you are driving to, consider an alternate route or delay travel. If you are caught in the middle of a snow squall while driving, reduce speed, use low beam headlights and try to exit the highway safely.

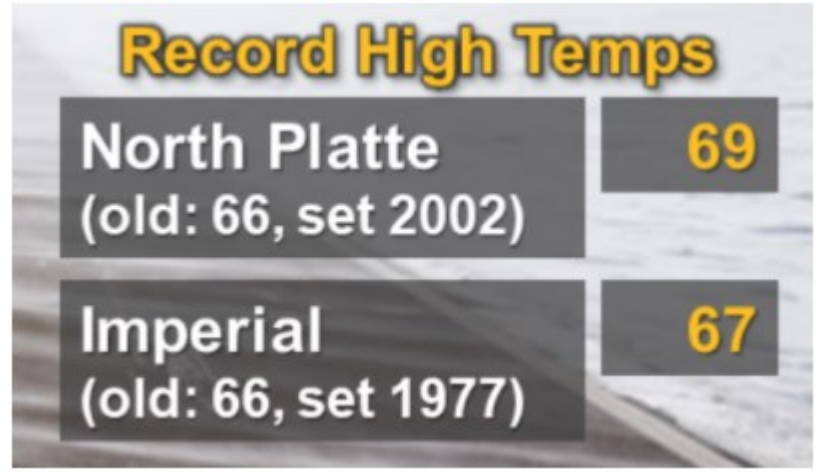
THERE IS NO SAFE PLACE ON A HIGHWAY WHEN SNOW SQUALLS ARE APPROACHING

December 15, 2021 Strong Storm System

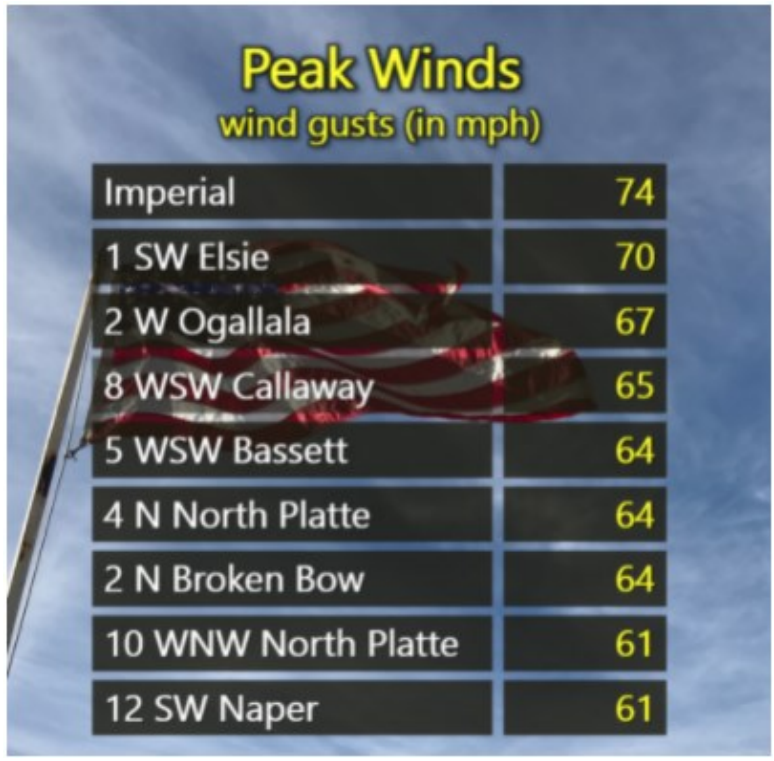
By Jaclyn Gomez - Meteorologist

In Mid-December a strong storm system moved into the Central United States. On Wednesday December 15th the system moved into the state of Nebraska creating numerous impacts across the state. Across western and north central Nebraska, impacts included strong gusty winds, blowing dust, blowing snow, snow squalls, thunderstorms and very cold air.

Ahead of the system temperatures were very warm and well above normal with highs in the 60s. In fact, temperatures were warm enough to break record highs. Record high temperatures were set in North Platte and Imperial. A record high temperature of 69 degrees occurred in North Platte, with Imperial reaching 67 degrees.



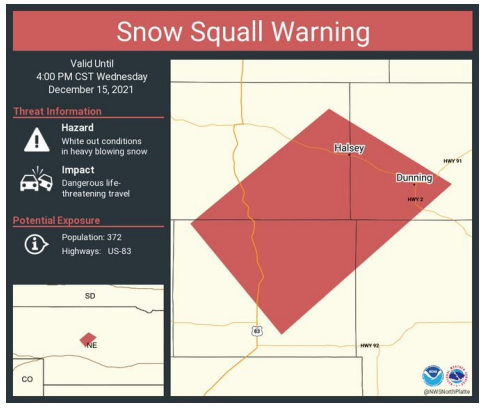
One of the first impacts felt from the system was the strong winds that started first across portions of western and southwest Nebraska in the early afternoon. A High Wind Warning was issued for all of Nebraska. Some of the strongest wind gust across western, southwest and north central Nebraska were seen between 2pm CT and 6pm CT, with gust greater than 70 mph in some locations.

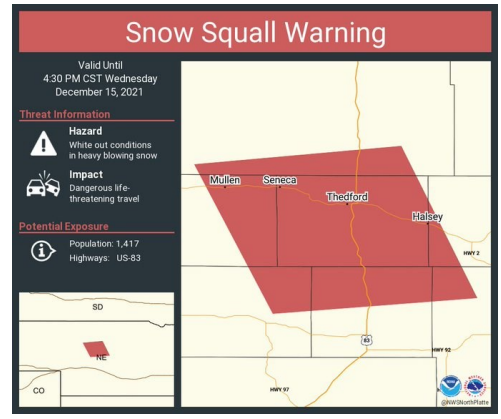


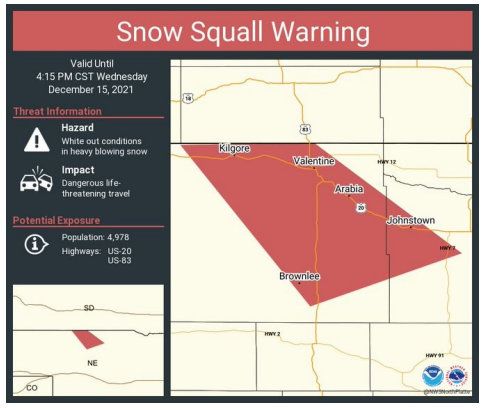
In the early afternoon portions of western and southwest Nebraska also saw areas of blowing dust from the strong gusty winds. (Continued on page 4)

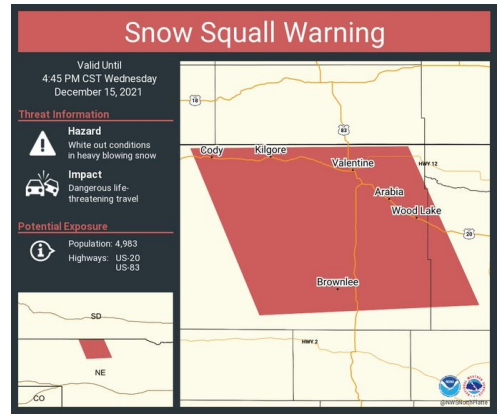
Then as the afternoon progressed rain and isolated embedded thunderstorms developed across southwest Nebraska and moved into the Sandhills and north central Nebraska. Areas of isolated thunderstorm activity was mainly seen along and east of Highway 83. Further east of the forecast area, across central and eastern Nebraska saw strong to severe thunderstorms, including tornadic storms.

By mid to late afternoon rain started to change to snow across western Nebraska with snow squalls forming in some locations. There were four snow squall warnings issued through the afternoon across portions of the northern and central Sandhills. Some locations included in the snow squall warnings were Valentine, Thedford, Dunning and Kilgore.









Cold air rushed in quickly behind the system with temperatures dropping into the teens and wind chill values in the single digits and teens.

Climate Basics
By Emma Sinclair-Meteorologist

"Climate" is a word used often by the media, scientists, and even in everyday vernacular. But do you know what climate is? Climate is the long-term average of temperature, precipitation, and other atmospheric variables for a given location. This is a time scale of decades, centuries, etc. Now how is this different from weather? Well, weather is what occurs in the atmosphere on a much shorter time scale such as a week, a day, or an hour. In other words, climate is what we'd expect, but weather is what we actually get. For example, climate is like what you have in your closet, but weather is like what you actually wear on a given day. A real example would be, knowing western Nebraska gets an average of 30 inches of snow every winter, but weather would be how much snow actually occurs on a given day.

Now what affects climate? Climate is affected on much longer time scales, so some natural sources of change include energy from the sun, changes in Earth's orbit, ocean currents, and volcanic eruptions. Let's dive into these a bit deeper.

Did you know that the sun isn't always the same level of brightness? The sun brightens or darkens over an 11 year period because the level of activity varies up or down, impacting the amount of radiation the sun gives out. This causes very small, yet mentionable, changes in climate on Earth. However, given the relatively short period of the cycle, many other forces affect Earth's climate much more, and on much longer timescales.

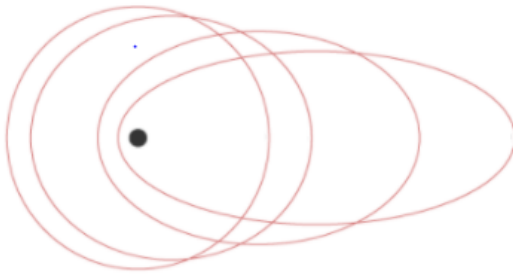
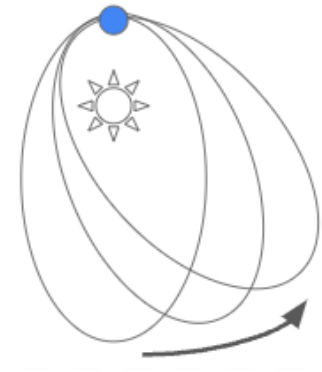


Photo from NASA Earth Observatory

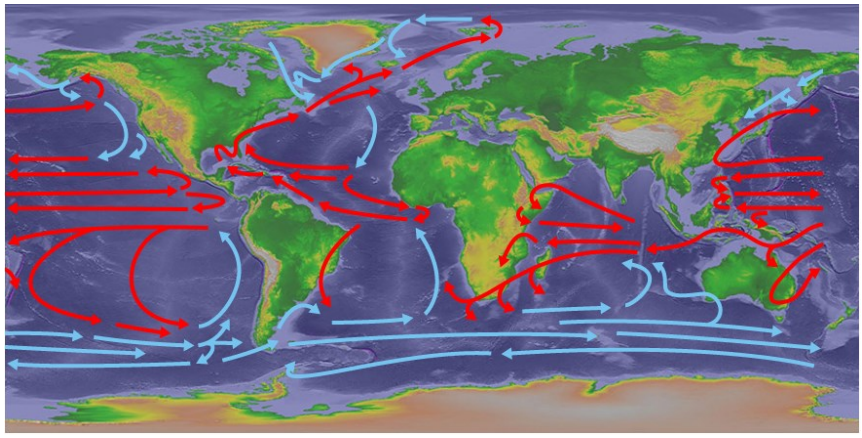
Did you know that Earth's orbit isn't perfect? It changes on large time scales (centuries!). Parts of this include Earth's eccentricity in its orbit, Earth's precession, and Earth's obliquity on its axis. Huh? Let me explain. Earth tries to orbit in a perfect circle around the sun, but gravitational pull from the sun in one direction, and Saturn and Jupiter in other directions makes the orbit into an ellipse, sort of like when someone hula hoops. Earth's eccentricity is how much this path deviates from being a perfect circle. As such, Earth's orbit cycles every 100,000 years (or more!) between its most circular and most elliptical path (seen above). This affects climate, because when the orbit is most elliptical, more radiation reaches Earth. Currently, Earth is in a more circular orbit, and is trending towards a more elliptical orbit. Similarly many know Earth spins on its axis, but it is better described as wobbling like a top.

This important aspect is Earth's precession. In other words, Earth's precession is its wobble on its axis. (continued on page 4)



This means that its orbit will be oriented in different alignments throughout the cycle (seen on right). This impacts climate because the wobble makes for strong seasonal contrasts between hemispheres. This cycle varies every 21,000 years or so. Lastly on the topic of Earth's orbit is its obliquity. This is when Earth's tilt varies between roughly 22 and 24 degrees. This affects climate as larger angles allow for more radiation to be received from the sun. Currently, the Earth's axis is around 23 degrees, and is slowly decreasing towards a minimum tilt. This cycle spans about 41,000 years. All three aspects put together are referred to as the Milankovitch Cycle, and have a natural effect on Earth's climate in the long term.

Did you know that almost ¾ of Earth is water? Because a majority of the globe is water, the oceans absorb most of the sun's radiation. Some spots warm more than others, thanks to Earth's tilt. As a result, the oceans act as conveyor belts to distribute warm (and cold) water around the world! In doing so, the ocean tries to regulate the climate. If the ocean didn't, we'd have hotter hots and colder colds.



Last but not least, did you know volcanic eruptions are acting in helping cool the planet? When a volcano erupts, it emits volcanic gases and ash into the air. These volcanic gases cause cooling, as they reflect solar radiation back into space, stopping the air from being heated further. In other words, these gases give the Earth shade. Since the atmosphere works to redistribute the warm and cold air across the planet, the effects of a volcanic eruption are worldwide. These gases and particles take a couple years to redistribute, or fall to the ground, thus impacting climate.

Now that you know a bit of climate, let's see how it relates to the High Plains. Climate here varies depending on the season. There is an average of about 21 inches of liquid precipitation each year. May, June, and July are the wettest months, yet each winter season brings around 30 inches of snow. In terms of weather, a single day can bring a mixture of rain, snow, and even thunderstorms! Climatologically, July is the hottest month for the High Plains, with average daily highs around 90 degrees. On the other hand, January is the coldest month with highs around 40 degrees.

For more information check out climate.gov.

Weather Trivia (answers on page 9)
By Bill Taylor

1.What temperature is the same on both Celsius and Fahrenheit scales?

A. 0°

B. -40°

C. 40°

D. 100°

2.True or False:

The coldest temperature on earth (-128.6°F) was recorded at the North Pole?

3. Which location is the cloudiest place on earth, averaging only 840 hours of sunshine per year?

A. Seattle, Washington

B. Edinburgh, United Kingdom

C. Reykjavik, Iceland

D. Torshavn, Faroe Islands

4. The driest location on earth is located in which country?

A. United States (Sonoran Desert)

B. Africa (Sahara Desert)

C. Chile (Atacama Desert)

D. China (Gobi Desert)

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Comments and suggestions are
always welcome. Your feedback is very important to us!

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Trivia Answers

1. B
2. False! Actually it was –128.6°F but it was recorded near the South Pole at Vostok Station, Antarctica. This occurred on July 21, 1983 when it's winter time in the Southern hemisphere.
3. D. Torshavn. Compare that with Yuma, Arizona which get's 4,000 hours of sunshine each year, making it the sunniest place on Earth!
4. C. The Atacama Desert in Chile. Portions of the desert region can go 4 years without seeing any measurable precipitation. Most locations, however do receive a little rainfall, but only around one tenth of an inch per year.